



Delaware Health Sciences Cluster

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Introduction

The Delaware Health Sciences Cluster is an initiative of the Delaware Economic Development Office (DEDO) to bring together health services industries to promote growth in this important sector of the economy. **Health sciences comprise 45,227 jobs and \$3.1 billion in the state in Fiscal Year 2006.**¹

What is a cluster? “Geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions (for example universities, standards agencies, and trade associations) in particular fields that compete but also co-operate.” (Dr. Michael Porter, 1998)

Gary Ferguson, Chief Operating Officer of Christiana Care Health Systems and Tom Leonardi, Vice President and General Manager of Dentsply-Caulk, Inc. serve as volunteer Co-Chairmen to the Delaware Health Sciences Cluster initiative, following the model established by Dr. Michael Porter and under the direction of Delaware Economic Development Office (DEDO).

The long-term prospects for health sciences are positive. The Bureau of Labor Statistics (BLS) states that healthcare occupations comprise 12 of the 20 fastest growing occupations for the projected period 2004-2014.² Furthermore, these jobs tend to pay above average wages (see the Delaware Office for Occupation and Labor Market Information Delaware Wages Publication³).

The North American Industry Classification System (NAICS) is used to identify the types of businesses that fall under the health sciences cluster.

During the second half of 2007, a series of meetings took place involving representatives from a cross-section of health sciences industries. The meetings were designed to be exploratory—to gather together a sample of health science leaders to determine if there is consensus on the challenges they face. The meetings included a strengths, weaknesses, opportunities, and threats exercise, and an input-output analysis. The outcomes of these exercises are detailed in this document.

¹ Delaware Economic Development Office

² (<http://www.bls.gov/oco/oco2003.htm>).

³ www.oelmi.net

The Health Sciences Cluster as defined by DEDO includes the following NAICS codes.

NAICS	Description
3391	Medical Equipment and Supplies Manufacturing
4235	Medical, Dental & Hospital Equipment Merchant Wholesalers
4461	Pharmacies and Drug Stores
54171	Research and Development in Physical, Engineering & Life Sciences
6211	Office of Physicians and Mental Health Specialists
6212	Office of Dentists
6213	Office of Health Practitioners
6214	Outpatient Care Centers
6215	Medical and Diagnostic Laboratories
6216	Home Health Care Services
6219	Ambulatory Services
622	Hospitals
623	Nursing and Residential Care Facilities

Source: DEDO

Mission Statements

Delaware Economic Development Office's mission is to be responsible for attracting new investors and businesses to the state, promoting the expansion of existing industry, assisting small and minority-owned businesses, promoting and developing tourism and creating new and improved employment opportunities for all citizens of the state.

This initiative is consistent with DEDO's cluster approach to economic development. Delaware's health science industries include exceptional research and development, medical equipment and supplies manufacturing, and medical services providers. Collectively, these groups have the potential for continued growth in the state. The purpose of the Health Sciences cluster is to enhance this growth and provide an environment in which these groups can flourish.

Health Sciences Cluster mission is to identify, develop, expand and promote activities and institutions that benefit the industry and its related suppliers in the State of Delaware.

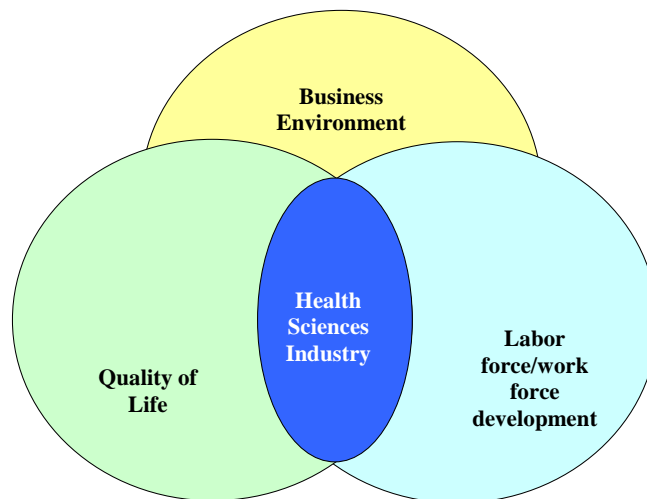
Influences on the Health Sciences Industry Cluster

There are three primary influences on the health sciences industry cluster. Each of these influences needs to be positive for the health of the cluster.

Business environment. How does the business environment affect the health sciences industry? The business environment includes issues such as infrastructure, energy, the environment, and government. Each has an impact on the way the industry does business and its competitive advantage.

Quality of Life. A number of factors influence the quality of life in a state including, but not limited to, housing, transportation, climate, and education. Quality of life can be a determining factor for businesses location and expansion decisions. If the quality of life erodes, then recruitment of skilled personnel will grow harder, which will adversely affect the industry performance.

Labor force/Labor force development. The supply of appropriately trained labor force is critical to the vitality of the industry.



Short-term Recommendations

Short-term recommendations are those that are actionable by DEDO over the next 12 months.

Support Health Sciences Workforce Development initiatives throughout the State of Delaware.

Although the limited supply of health science professionals continues to be a Delaware-employer concern, as it is across the nation, Delaware has demonstrated some significant, positive responses to the challenges. Some examples include but are not limited to Governor Minner's allocation of a portion of the federal Workforce Investment Act funds to Nursing Scholarships and the State's support of the Henry C. Conrad Schools of Science that offers a rigorous curriculum focused on the areas of biotechnology and allied health. Cluster members expressed the need to continue exploration of innovative and timely initiatives to further develop availability, access and quality of Delaware's health science professionals.

Another program that has demonstrated results in attracting health professionals to underserved areas is the State Loan Repayment Program of the Delaware Health Care Commission in cooperation with the Delaware Higher Education Commission and the Delaware Division of Public Health, this program re-pays a portion of educational debt in exchange for practicing in designated underserved areas of the state.

According to Merritt, Hawkins and Associates, a national physician recruiting firm, only one-third of medical school graduates report having no debt. In 2006 over half the graduates reported debt ranging from \$50,000 - \$250,000, with roughly half reporting that educational debt is a major or somewhat of a concern.

Under the program, participating clinicians provide health services in an underserved area for a minimum of two years in exchange for payments toward their educational loans. The program has been very successful since increasing the maximum award to \$70,000 for a two-year contract and adding twelve new specialties to the list of eligible clinicians. Since the program's inception in 2001, nine dentists, twenty-seven physicians, two certified nurse midwives and three certified nurse practitioners have been placed in underserved areas of the state. Annual appropriations are \$150,000 for physicians and allied health professionals and \$100,000 for dentists. With additional resources, this program holds promise to be another important tool for bringing health professionals into Delaware.

Resource mapping of existing health-science simulation training within State of Delaware facilities and academic settings and explore potential for increased capacity to enhance workforce development for new professionals as well as recertification of existing personnel. Cluster members value knowledge regarding what is currently available within the state, identification of gaps and potential for positive return on investment for expansion of health-related simulation as an alternative for some of the required hours of "hands on" experience included in the "clinical" portion of the training/education/continuing education for health care professionals.

Dr. Robert Barchi, President of Thomas Jefferson University reported at the November 2, 2007 *Creating Knowledge-Based Partnerships Conference* at the University of Delaware, that they use extensive simulation training within their curriculum at their medical colleges. Thomas Jefferson University is composed of three colleges--Jefferson Medical College, the Jefferson College of Graduate Studies and the Jefferson College of Health Professions. The three colleges enroll more than 2,300 future physicians, scientists and health-care professionals. Approximately 85 of these students are Delaware residents and many others do, in fact, work within Delaware facilities as part of the Residency training.

An informal survey of Delaware's health sciences cluster indicates that significant investments in simulation and other alternative educational and experiential learning opportunities have already been made by several Delaware businesses. One such example can be easily viewed on Nemours web site, located at <http://www.pedref.org/> where information regarding *Free CME Credit* is available, "CME credit for PedsEducation.org is provided free of charge as a service of Nemours. Part of the Nemours mission is to provide services to improve the health of children. By providing this credit at no cost, we hope to encourage pediatricians, family physicians, specialists, and other health professionals to continually improve their practice through education."

Delaware may be poised to further enhance our national recognition and increase recruitment and retention of health-related professionals by developing even more robust clinical training and continuous education credit opportunities. The resource mapping would provide a benchmark of current availability that may provide an additional recruitment tool for professionals as well as businesses associated with experiential learning through simulation. The research would also provide insight into best practices and outcomes that would be useful in the policy discussions regarding any potential changes to existing Delaware licensure regulations.

Support DEDO's effort to create a promotional video about Delaware. Such a video will serve as a recruitment tool for cluster firms as well as the broader business community. Cluster members have identified the recruitment of qualified employees as a critical strategic issue. The inclusion of testimonials by

executives (CEO/COO/CFO level at leading Delaware employers) would send a signal to potential businesses and workers that there are strong business advantages to coming to Delaware, as well as employment and education opportunities for any other significant stakeholders.

This will serve as a quality of life expo that will aid in recruitment. The video should highlight the achievements of Delaware's schools. Ideally, the video should be able to be distributed on disk or USB drive, and be able to be streamed via the Internet.

Share the outcomes with Governor Minner and her Administration and continue to meet as a cluster. The group will meet in the first quarter of 2008 to discuss strategies for expanding the short-term objectives, reviewing the current status of implementation and refining the strategies for future business expansion and recruitment of the Health Sciences Cluster. In addition to the quantifiable objectives of increasing employment and business development within the cluster, the members expressed appreciation for the value of networking, the opportunity to discuss issues that are important to their respective businesses and to share those mutual concerns with the Governor and her Administration.

Long-term Recommendations

A number of issues have been identified as impediments to the health of the cluster's industries. Some fell outside the scope of DEDO; some are not actionable in the near term. Nevertheless, the members feel that these items need be monitored as the cluster moves forward.

Improve perception of Delaware public schools. The education system is commonly cited as an impediment to the success of state businesses. The impact of the education system is twofold. First, health sciences cluster members believe that the public education system is failing to provide qualified graduates in sufficient numbers to work at member businesses. Second, health sciences cluster members believe that the perception of the public education system adversely influences the relocation decision of employers and employees considering Delaware as a place to live and work.

Several initiatives are currently underway, such as Vision 2015 that are actively seeking to improve the performance of Delaware schools. The Health Sciences Cluster applauds those efforts and recommends ongoing marketing and public relations to improve the perception of our education system.

Recruit scientists, researchers, engineers, physicians and other allied health professionals to work in Delaware businesses. Health Sciences Cluster members across all sectors expressed firm agreement regarding the existence of critical shortage of workers within these occupations. This needs to be addressed by expanding science programs at appropriate education institutions within the State of Delaware. In this manner a consistent supply of quality labor will be available for health science industries in the state, which in turn will bolster their competitiveness.

Research and consider medical malpractice/tort reform.

This issue was raised by a number of members and is believed to be a driver of health costs in the state. Legislative action would be required to address this issue.

Methodology

The cluster was launched through meetings strategically located throughout all three counties. The first meeting was hosted by the Delaware Healthcare Association at their premises in Kent County. The second was hosted by Christiana Care Health Systems in New Castle County. The third meeting was hosted by Dentsply-Caulk, Inc. in Sussex County.

The first meeting included a **SWOT** exercise (strengths, weaknesses, opportunities, threats). Strengths and weaknesses are often thought of as being internal, and threats and opportunities as being external (although there are exceptions). The SWOT items then populate the strategic issues of an organization.

A SWOT analysis is an effective means to quickly poll attendee's thoughts. Four groups were formed, and each group was given ten minutes to brainstorm on a particular item, e.g. strengths for their health sciences organization in Delaware. Their answers were recorded, then they moved on to the next item, e.g. weaknesses. At the end of the process, each group had four lists: strengths, weaknesses, opportunities, and threats. The lists were then shared with all attendees, wherein an opportunity for clarification was afforded. Finally, each attendee voted on the most important issue(s) using a dot-vote system. Each person had four votes, which could be placed on one or more items, at their discretion.

These strengths, weaknesses, opportunities and threats were then examined to determine which met the criteria for a *strategic issue*, as defined on page 11 of this report.

The second meeting included an **input-output exercise** that quickly gathered information about what health sciences businesses need to operate (inputs), and exists because of their operation (outputs). The attendees were divided into groups, and asked to brainstorm their inputs and outputs. In effect they were posed the questions “what do you need to operate in Delaware?” and “what exists because you operate in Delaware?” Examples might include skilled workers, customers within the area, access to transportation for raw materials, products, services and/or customers as inputs and intellectual property, hazardous waste material, jobs, etc as outputs.

The third meeting was dedicated to synthesizing the data that had been collected and reaching consensus on the short-term and long-term recommendations across the broad range of stakeholders represented within the Health Sciences Cluster.

Strategic Issues

“Strategic issues are fundamental policy questions or critical challenges that affect an organization’s mandates, mission, and values; products or service level and mix; clients, users, or payers; or cost, financing, organization, or management.” Bryson.

Observations

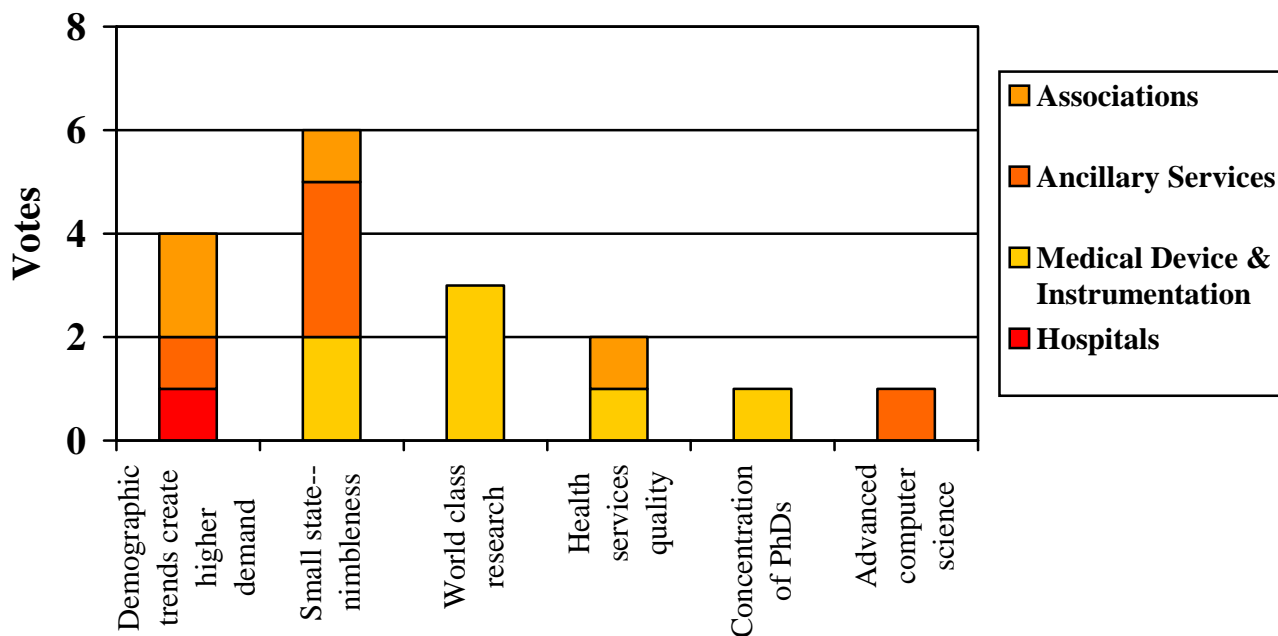
The Health Sciences Cluster draws from both the private and public sectors. It is useful to compare and contrast the issues raised by these disparate sectors as pertains to health sciences in the state.

Delaware's health sciences industry will continue to face competition—both domestic and international. These industries need to be nimble enough to adapt to change quickly lest they lose their competitive advantage.

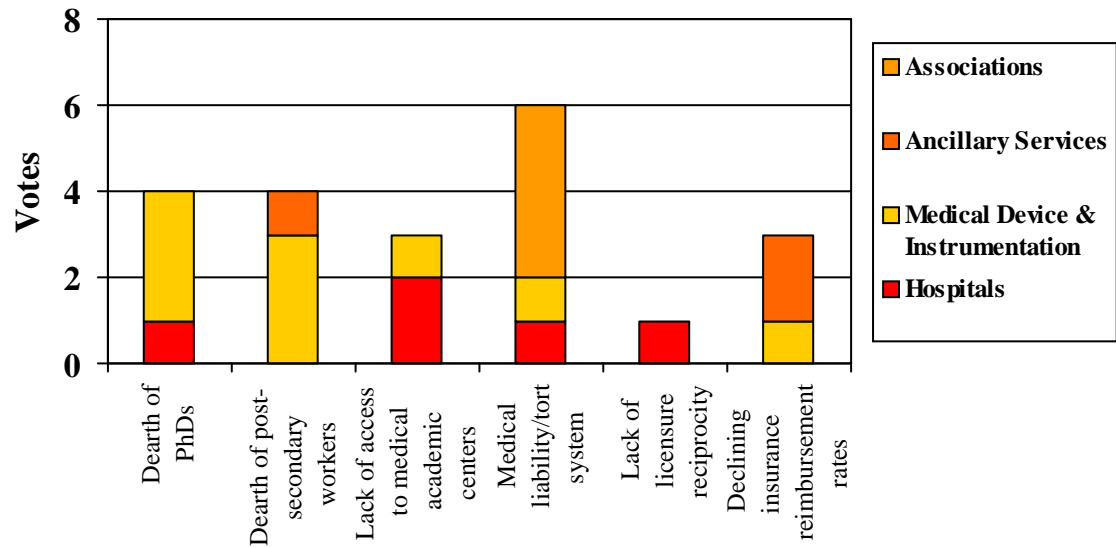
Other states are organizing their industries via cluster-type initiatives—an attempt to strengthen their industries in reaction to the intense competition. Several states seek to develop a reputation or brand their health sciences industries. The benefits would be to attract and grow related businesses as well as to ameliorate the recruitment issue.

Delaware's Health Science cluster issues, as described by the members during the SWOT analysis are illustrated in the following four charts:

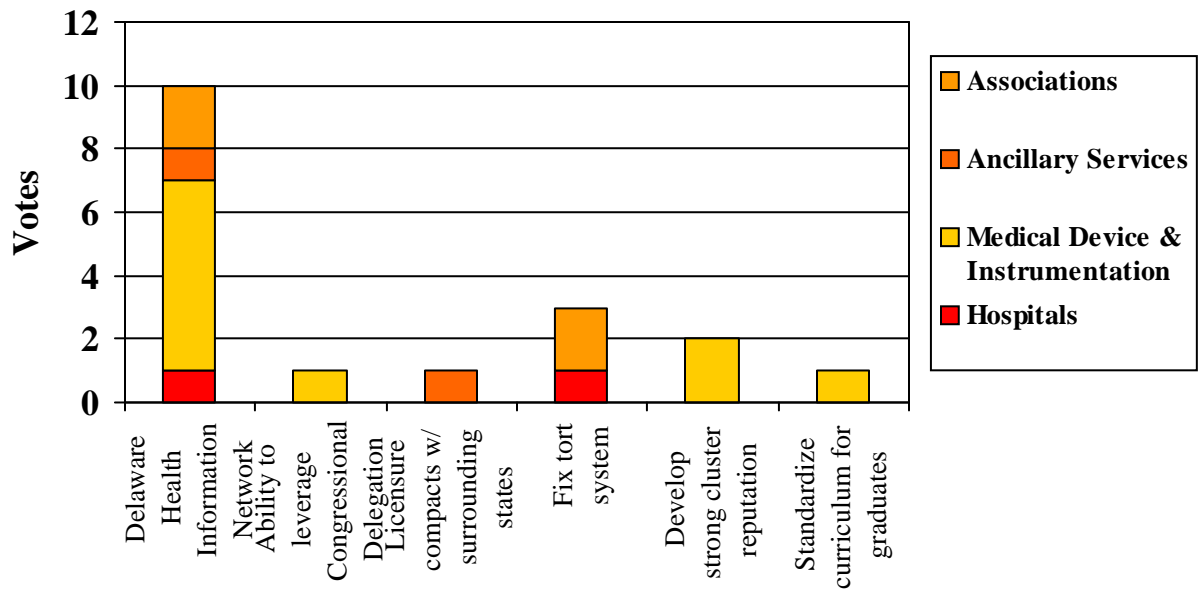
STRENGTHS (Overall)



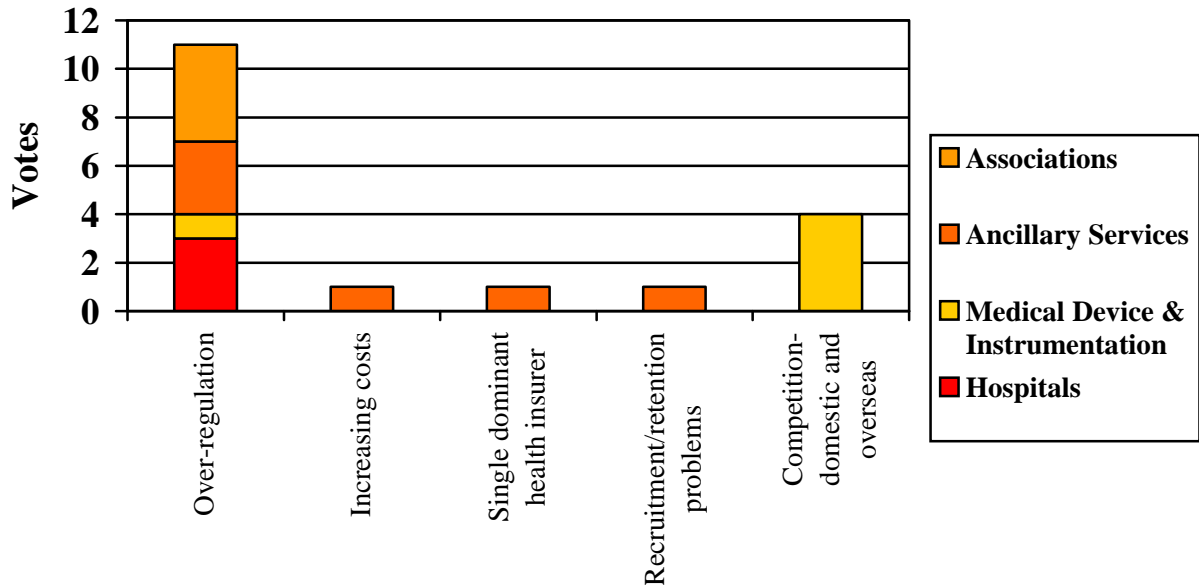
WEAKNESSES (Overall)



OPPORTUNITIES (Overall)



THREATS (Overall)



Private firms (medical device and instrumentation manufacturers) are concerned about the threat posed by competition (both domestic and overseas).

Recruitment and retention is a further issue, though not unique to these private firms. Private firms are citing difficulty attracting qualified workers across the education spectrum. The poor perception of public schools may contribute to this phenomenon.

Private firms also report that the lack of access to medical academic centers for research and development is a weakness. So too is the lack of a collaborative mechanism among Delaware health sciences industries. Over-regulation is also quoted as a weakness.

Hospitals also cite the lack of easy access to medical personnel as a weakness. Hospitals further contend that medical liability and the tort system limits the number of practices in the state. Recruitment and retention is also a weakness, and the poor perception of Delaware schools could negatively impact recruitment efforts.

Ancillary services believe that licensure compacts with surrounding states present an opportunity to strengthen the health sciences industry.

Ancillary services rank the DHIN as an opportunity.

Following the SWOT analysis, each person had four votes, colored coded to denote their industry. A person could vote more than once for an item. The SWOT issues could then be cross-tabulated by industry to reveal their relative importance.

SWOT Issues: Cross-tabulated by Industry

Medical Device & Instrumentation Manufacturing (Private Firms):

The highest vote earner was Delaware's "small state environment creates nimbleness and opportunities for partnerships and collaboration." This is the highest vote earner among Delaware medical device and instrumentation firms. The second highest strength for these private firms was "world class research that can spin-off productions; Delaware has disproportionately high level of health research."

The other strengths cited by private firms are "high level/concentration of PhD's for R&D" and "high quality of health care in Delaware." While Delaware has a high level/concentration of PhD's, critical shortages still persist in certain fields and industries, which is reflected by Health Sciences Cluster members' cited recruitment and retention problems.

"Poor perception of public schools" was the highest ranked weaknesses for these private firms. The next highest ranked weaknesses are both work force related. Private firms are reporting the lack of appropriately educated workers as a key weakness in Delaware with workers at both ends of the education spectrum in short supply.

Other weaknesses for private firms include lack of access to medical academic centers for research and development; no infrastructure to facilitate collaboration and networking; the medical liability/tort system; and declining reimbursement rates.

Among the opportunities identified by private health sciences firms, the Delaware Health Information Network (DHIN) was the primary. Interestingly, members of all the Health Sciences Cluster industries identified DHIN as an opportunity.

Access to federal funding, possibly by leveraging the congressional delegation, and developing a standardized curriculum for health sciences technical training rounded out the opportunities for private businesses.

Competition, perhaps not surprisingly, is cited as the number one threat to medical device and instrumentation manufacturers. This competition is both domestic—competing health sciences clusters—and international, where manufacturing costs are lower.

Regulation is perceived to be a threat to private firms. Over-regulation of the medical industry and the high cost of litigation could negatively impact the cluster if left unchecked. The inability to recruit scarce professionals and the cost of retention round out the threats.

Hospitals:

Hospitals cited demographics as the primary strength. Demographic trends such as positive population growth and an aging population will generate greater demand for services.

Lack of easy access to medical academic center for research and development is the primary weakness for hospitals. Further, there exists a lack of collaboration among health care providers, and no infrastructure to facilitate this.

The Health Sciences Cluster may provide the appropriate infrastructure for collaboration among the various health sciences businesses.

A shortage of professional and doctoral level workers (including physicians, dentists and psychologists/psychiatrists) coupled with aging expertise among the existing workers are the second most frequently cited weakness.

Hospitals contend that the medical liability and tort system limit practices in the state. Poor perception of public schools is also seen as a weakness.

Again, the DHIN ranks high as an opportunity, this time for hospitals. Tort system reform is the second highest opportunity cited. This item relates to the threat of over regulation and high level of litigation to the hospitals.

Ancillary Services:

Ancillary services believe that Delaware's size brings strength via nimbleness and opportunity for partnerships and collaborations. Further strengths include strong demographic trends and the strong informational gateway/advanced computer science technology.

Declining insurance reimbursement rates are the primary weakness for ancillary services, followed by the poor perception of public schools, and the dearth of high tech/highly skilled post secondary workers.

Creating professional licensure compacts with surrounding states is second only to the DHIN as an opportunity to strengthen ancillary services in the state.

Threats to ancillary services include over-regulation, increasing cost of expenses such as health care, workers compensation, and the cost of local manufacturing, and a single, dominant health insurer.

Health-Related Associations:

Health-related associations view demographic trends, health services quality, and the small state environment as the primary strengths of health sciences in Delaware. Health-related associations believe that medical liability and the tort system are a weakness. Opportunities comprise the DHIN and reforming the tort system. Over-regulation poses a threat to the health sciences industries in Delaware.

Health Sciences Cluster Meeting Attendees

Name and Affiliation	First Meeting	Second Meeting	Third Meeting
Gary Ferguson, Christiana Care Health System, Co-Chair	✓	✓	
Tom Leonardi, Dentsply Caulk, Co-Chair	✓		✓
Paul Kempinski, Nemours	✓	✓	
Jack Riddle, Nanticoke Hospital	✓	✓	✓
Andrew Johnson, Dentsply Caulk	✓		✓
Mie Mie Strickler, B&W Tek, Inc.	✓	✓	
Brian Pryer, LiteCure, Inc.	✓		
Bob Lydum, Agilent Technologies	✓		✓
Bruce Humphries, Dade Behring	✓	✓	
Paula Roy, DE Healthcare Commission	✓	✓	
Mark Meister, Medical Society of Delaware	✓	✓	✓
Joseph Elad, Quantum Leap	✓		
Dr. Ganesh Vaidyanathan, Quantum Leap	✓		
Apperson Johnson, Quantum Leap		✓	✓
Robert White, DE Physicians (Schaller/Anderson)	✓	✓	✓
Bill McGinnis, Lab Corp	✓	✓	✓
Jean Mullin, Bayada Nurses	✓	✓	✓
Mary Polk, Nephrology Associates	✓		
Wayne Smith, DE Healthcare Association	✓	✓	✓
Yrene Waldron, DE Healthcare Facilities Association	✓		✓
Ed Krupka, Burris Logistics	✓	✓	
Myron Sasser, MIDI, Inc.		✓	
Carrie Casey, St. Francis Hospital Foundation		✓	
Betty Paulanka, University of DE, College of Health Sciences		✓	✓
Dr. Robert Cox, Nephrology Associates		✓	✓
Dr. Myria Mack-Williams, The Bethesda Clinic		✓	
John Van Gorp, Sr., BayHealth			✓
Simon Condliffe, CADSR University of Delaware, facilitator	✓	✓	✓
Patricia A. Cannon, MSM, Health Sciences Market Leader, Delaware Economic Development Office	✓	✓	✓
Susan M. Graham, Administrative Specialist for Market Development, Delaware Economic Development Office	✓	✓	✓
Tyler Ross, Market Director, Delaware Economic Development Office		✓	

Appendix A

The following items were identified as being strengths, weaknesses, opportunities and threats.

Strengths

- Run like strategic business unit. Have input/control over product portfolio
- Health services quality: DE known for being easier to recruit quality physicians; Able to recruit & access to community for expertise among physicians; high level of physician skill and knowledge;
- Broad economic impact, both quality and economy; relative to size of company (&/or industry) as a Delaware employer;
- High level /concentration of PhD's (talent) for R&D - DNA analysis
- Close collaboration with and among health care providers in Delaware
- World class research that can spin-off products; Delaware has disproportionately high level of health research
- High QUALITY of health care in Delaware
- Innovative application of medical technologies; one specific example of innovative application of technology is "polymer resin" dental material
- Informational gateway: speed & quality of critical lab value to medical providers; Advanced computer science technologies w/expertise in biology, life science and medicine
- Small state environment creates nimbleness and opportunity for partnerships and collaboration: Delaware's advantages include its proximity to Federal Government and Academia; Hourly cost of workforce is attractive; availability of land; quality of life including relatively low crime, recreational opportunities, cultural, near major urban areas; more efficient partnerships; access to policy makers; many good educational systems; well developed transportation system
- Demographics will generate greater demand for services; services available through multiple sites; Northeast is densely populated - access to customers/workers [Health Science companies, like sports teams, set-up where they have access to high volume of people]
- Flexible, customer focused / customized logistics solutions

Weaknesses

- PROFESSIONAL (Doctorate level): Aging expertise; inexperienced but educated replacements; Declining # of scientists coming to Delaware; school system for graduate/employers; relocating people; Mal-distribution of physician specialties, such as psychiatrists; No easy access to medical academic centers for R&D Technology companies; difficult to recruit professional staff - no local talent means high relocation costs
- HIGH-TECH/HIGHLY SKILLED (Post-secondary): Workforce Issues + Labor pool: Nurses & non-professional technical admin.; therapies -

- No easy access to medical academic centers for R&D Technology companies; DE's small size can limit breadth of activities such as highly specialized services (i.e., no medical school); Lack of collaboration among healthcare providers and advanced, health-related technology, R&D, etc.; No infrastructure to facilitate collaboration and networking within industries
- Medical Liability /Tort system limits practices [opportunity - fix tort & re-direct energy tort reform to quality improvement - political solution]
- Poor perception of public schools in Delaware
- Licensure and reciprocity limits ability to attract professionals; Highly & overly regulated; scope of practice issues
- Insurance reimbursements: declining rates
- Health Care (Science) cluster is strong, but not recognized as significant beyond Delaware borders [Also an Opportunity]
- Highly concentrated competition in the region for pediatric health care services [and other Health Sciences companies?]
- Worker's Compensation is expensive
- Funding for uninsured services
- Cost of healthcare is high in Delaware
- I.T. - Lack of availability of adequate solutions; DE is not recognized as a center for software innovation (not a silicon valley)
- Difficult to benchmark because no local company is in the same market: rural vs. urban

Opportunities

- The DHIN (DE Health Information Network): Health informatics and Personalized Medicine: DHIN creates connectivity among health care providers, improves efficiency, creates data availability; greater transparency on sharing data and information - inside and outside of Delaware
- Access to federal funding + Ability to leverage the Congressional Delegation to create business opportunities
- Work to mitigate over-regulation that stifles entrepreneurial efforts
- Easier to move as a small state towards health care reform
- Professional Licensure compacts w/surrounding states; Modernize licensure issue
- Fix Tort system: be innovative
- Develop strong, positive reputation; Create networking opportunities in Delaware; Broadening life sciences portfolio - produce, services, manufacturing / Low cost manufacturing base

- Create basic standardized curriculum for technical training needed to join the workforce
- Bring more health insurance "backroom" operations to Delaware
- Sussex County Growth; DE in general growth; Baby Boomer Demographic - increased aging population; Growth opportunities for geriatric care in southern DE;
- Invest more in enhancing the lives of children and families; Ditto for the retiree population

Threats

- Health care industry & professions vulnerable to over-regulation / legislation; Over-regulation of the medical industry; high level of litigation; increasing regulations on multiple fronts; Government is a large purchaser
- Reimbursement decline; dwindling funding streams
- Increasing cost of expenses: Health care & Worker's Comp; cost of local manufacturing;
- Advances in technology are out-pacing knowledge base of the potential workforce
- Single dominant health insurer; decreasing choice of Health Insurance Carriers;
- Inability to recruit scarce professionals and increased cost of retention
- Global competition: need to compete on workforce cost against other countries, not just other states; Low Cost international manufacturing AND international high tech R&D; plus competing Health Sciences clusters in PA / NJ / MD
- Regulatory process in Delaware doesn't move fast enough to support growth opportunities (need accelerated permitting process)
- Health care expanded portion of economy: is both good and bad depending on who you are & where you sit [acknowledge this is true of other clusters as well]; End of life expenditures & issues; we're getting too healthy
- Mal-distribution of workers; young people are leaving Delaware; inability to maintain scientific expertise in Delaware
- People want "everything" but want someone else to pay for it; Disconnect between purchaser and consumer of health care [this is true of education as well as health care] and leads to reduced accountability

Appendix B

Medical Devices and Instrumentation SWOT Items

Strengths	Weaknesses
<ol style="list-style-type: none"> 1. World class research that can spin-off products; Delaware has disproportionately high level of health research 2. Small state environment creates nimbleness and opportunity for partnerships and collaboration: Delaware's advantages include its proximity to Federal Government and Academia; Hourly cost of workforce is attractive; availability of land; quality of life including relatively low crime, recreational opportunities, cultural, near major urban areas; more efficient partnerships; access to policy makers; many good educational systems; well developed transportation system 3. High level /concentration of PhD's (talent) for R&D 4. High quality of health care in Delaware 	<ol style="list-style-type: none"> 1. Poor perception of public schools in Delaware 2. Dearth of professional/doctorate level: Aging expertise; inexperienced but educated replacements; Declining # of scientists coming to Delaware; Mal-distribution of physician specialties, such as psychiatrists; 3. Dearth of High tech/highly skilled post-secondary: 4. No easy access to medical academic centers for R&D Technology companies; DE's small size can limit breadth of activities such as highly specialized services; Lack of collaboration among healthcare providers and advanced, health-related technology, R&D, etc.; No infrastructure to facilitate collaboration and networking within industries 5. Medical Liability /Tort system limits practices 6. Insurance reimbursements: declining rates
Opportunities	Threats
<ol style="list-style-type: none"> 1. DHIN Health informatics and Personalized Medicine: DHIN creates connectivity among health care providers, improves efficiency, creates data availability; greater transparency on sharing data and information - inside and outside of Delaware 2. Develop strong, positive reputation; Create networking opportunities in Delaware; Broadening life sciences portfolio - produce, services, manufacturing / Low cost manufacturing base 3. Access to federal funding + Ability to leverage the Congressional Delegation to create business opportunities 4. Create standardized curriculum for technical training needed for workforce 	<ol style="list-style-type: none"> 1. Global competition: need to compete on workforce cost against other countries, not just other states; Low Cost international manufacturing AND international high tech R&D; plus competing Health Science clusters in PA / NJ / MD 2. Health care industry & professions vulnerable to over-regulation / legislation; Over regulation of the medical industry; high level of litigation; increasing regulations on multiple fronts; Government is a large purchaser 3. Inability to recruit scarce professionals and increased cost of retention

Hospital SWOT Items

Strengths	Weaknesses
<ol style="list-style-type: none"> 1. Demographics will generate greater demand for services; services available through multiple sites; Northeast is densely populated - access to customers/workers. 	<ol style="list-style-type: none"> 1. No easy access to medical academic centers for R&D Technology companies; DE's small size can limit breadth of activities such as highly specialized services (i.e., no medical school); Lack of collaboration among healthcare providers and advanced, health-related technology, R&D, etc.; No infrastructure to facilitate collaboration and networking within industries 2. Dearth of professional/doctorate level workers: Aging expertise; inexperienced but educated replacements; Declining # of scientists coming to Delaware; school system for graduate/employers; relocating people; Mal-distribution of physician specialties, such as psychiatrists; No easy access to medical academic centers for R&D Technology companies; difficult to recruit professional staff - no local talent means high relocation costs 3. Medical Liability /Tort system limits practices. 4. Poor perception of public schools in Delaware 5. Licensure and reciprocity limits ability to attract professionals; Highly & overly regulated; scope of practice issues
Opportunities	Threats
<ol style="list-style-type: none"> 1. The DHIN (DE Health Information Network): Health informatics and Personalized Medicine: DHIN creates connectivity among health care providers, improves efficiency, creates data availability; greater transparency on sharing data and information - inside and outside of Delaware 2. Fix Tort system: be innovative 	<ol style="list-style-type: none"> 1. Health care industry & professions vulnerable to over-regulation / legislation; Over regulation of the medical industry; high level of litigation; increasing regulations on multiple fronts; Government is a large purchaser

Health Care Ancillary Services SWOT Items

Strengths	Weaknesses
<ol style="list-style-type: none"> 1. Small state environment creates nimbleness and opportunity for partnerships and collaboration: Delaware's advantages include its proximity to Federal Government and Academia; Hourly cost of workforce is attractive; availability of land; quality of life including relatively low crime, recreational opportunities, cultural, near major urban areas; more efficient partnerships; access to policy makers; many good educational systems; well developed transportation system 2. Informational gateway: speed & quality of critical lab value to medical providers; Advanced computer science technologies w/expertise in biology, life science and medicine 3. Demographics will generate greater demand for services; services available through multiple sites; Northeast is densely populated - access to customers/workers [Health Science companies, like sports teams, set-up where they have access to high volume of people] 	<ol style="list-style-type: none"> 1. Insurance reimbursements: declining rates 2. Poor perception of public schools in Delaware 3. Dearth of high tech/highly skilled (Post-secondary): Workforce Issues + Labor pool: Nurses & non-professional technical admin.; therapies - speech, physical & occupational; Lack of availability & access to high tech, skilled labor in Medical Device industry; Base workforce resistant to change; attraction of stable, blue collar workers; Local Delawareans resist change; Employee workforce available but needs high investment in training
Opportunities	Threats
<ol style="list-style-type: none"> 1. The DHIN (DE Health Information Network): Health informatics and Personalized Medicine: DHIN creates connectivity among health care providers, improves efficiency, creates data availability; greater transparency on sharing data and information - inside and outside of Delaware 2. Professional Licensure compacts w/surrounding states; Modernize licensure issue 	<ol style="list-style-type: none"> 1. Health care industry & professions vulnerable to over-regulation / legislation; Over regulation of the medical industry; high level of litigation; increasing regulations on multiple fronts; Government is a large purchaser 2. Increasing cost of expenses: Health care & Workers Comp; cost of local manufacturing; 3. Single dominant health insurer; decreasing choice of Health Insurance Carriers;

Health Related Associations SWOT Items

Strengths	Weaknesses
<ol style="list-style-type: none"> 1. Demographics will generate greater demand for services; services available through multiple sites; Northeast is densely populated - access to customers/workers 2. Health services quality: DE known for being easier to recruit quality physicians; Able to recruit & access to community for expertise among physicians; high level of physician skill and knowledge; 3. Small state environment creates nimbleness and opportunity for partnerships and collaboration: Delaware's advantages include its proximity to Federal Government and Academia; Hourly cost of workforce is attractive; availability of land; quality of life including relatively low crime, recreational opportunities, cultural, near major urban areas; more efficient partnerships; access to policy makers; many good educational systems; well developed transportation system 	<ol style="list-style-type: none"> 1. Medical Liability /Tort system limits practices.
Opportunities	Threats
<ol style="list-style-type: none"> 1. The DHIN (DE Health Information Network): Health informatics and Personalized Medicine: DHIN creates connectivity among health care providers, improves efficiency, creates data availability; greater transparency on sharing data and information - inside and outside of Delaware 2. Fix Tort system: be innovative 	<ol style="list-style-type: none"> 1. Health care industry & professions vulnerable to over-regulation / legislation; Over regulation of the medical industry; high level of litigation; increasing regulations on multiple fronts; Government is a large purchaser

Appendix C

Input-Output Exercise

The group went through an input-output exercise designed to solicit information about what their organization needs to operate (inputs) and what exists because of their organization (outputs).

Inputs include

- *Transportation, including aviation, interstate and local secondary roads*
- *Utilities – reliable and affordable*
- *Access to Professional (post-graduate level) employees*
- *People: adequately trained, highly skilled PhD's, Engineers, Systems Specialists & other health professionals*
- *Access to highly-trained (post-secondary) employees*
- *Safe, reliable means to dispose of bio-waste*
- *State of the art medical technology*
- *State of the art information technology and secure data*

Outputs include

- *Family-sustaining jobs*
- *Healthy economy with healthy population*
- *Intellectual property*
- *Products, many of which are consumed elsewhere*
- *Charity / Community investments*